



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/524,525	08/18/2005	Martin Hausner	BEET-09	1134
26875 7590 12/30/2008 WOOD, HERRON & EVANS, LLP 2700 CAREW TOWER 441 VINE STREET CINCINNATI, OH 45202				
EXAMINER				
AHMED, SIAMIM				
ART UNIT		PAPER NUMBER		
1792				
MAIL DATE		DELIVERY MODE		
12/30/2008		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/524,525

Applicant(s)

HAUSNER, MARTIN

Examiner

Shamim Ahmed

Art Unit

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 October 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 24-45 and 47-50 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 24-45 and 47-50 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/S508)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 24-45 and 47-50 have been considered but are moot in view of the new ground(s) of rejection.
2. As to claims 48, applicant's argument is not persuasive as the claim is limited to a product by a process claim as long as the product is taught by the prior art (Nakagawa et al).

Examiner also states that the argument is not commensurate with the claim because the claim is limited to a product claim not a process claim and furthermore the aluminum layer is capable of working as a mask layer while the under layer to be etched.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
4. Claims 24-45, 49-50 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
5. Regarding claims 24, 49 and 50, the phrase "inductively coupling power from a source located within the container" renders the claim indefinite because it is unclear how a source power can be located within the container or chamber.

6. In the following rejection, examiner interprets that it is the inductive coil or antenna is located inside the chamber or container not the source for the inductively coupling power.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claim 48 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Nakagawa et al (5,599,743).

Nakagawa et al teach a semiconductor wafer (1) and a masking layer (4) of aluminum alloy film (col.1, lines 19-27 and figure 1), in which the aluminum alloy comprises 0.5 to 1 weight percent of silicon or the alloy could comprises copper in the range of 0.1-4 wt. Percent (col.3, lines 49-59).

It is noted that titanium content is optional in the aluminum alloy.

In the event of any differences can be shown for the product of the product-by-process claim 48, as opposed to the product taught by Nakagawa, such differences would have been obvious to one of ordinary skilled in the art as a routine modification of the product in the absence of showing of unexpected results; see also *In re Thorpe*, 227 USPQ 964 (Fed. Cir. 1985).

9. Claims 24-45, 47 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Song et al (6,821,901) in view of Yin et al (6,270,617) and further in view of Ye et al (6,270,687).

Song et al disclose a silicon etching process utilizing an inductively coupled plasma etching through a masking layer of aluminum, wherein the etching is dry etching and the etching is performed in Bosch process such as etching and passivation steps are carried out alternatively (col.5, lines 50-col.6, line 7).

Song et al teach the etching create an etched cavity of about 250 μm deep (col.6, lines 7-9).

Song et al differs from the instant invention in that the substrate is kept at a distance of at least twice the mean free path length of the plasma atoms or at least 8 cm from the inductive coupling.

Yin et al disclose a RF plasma reactor having induction coil above the substrate to be processed and also illustrate that the distance between the substrate and the inductive coil provides major roles in the plasma uniformity by increasing the ion density across the wafer surface; the distance between the ceiling and the substrate is within the range of 4-12 inches, which equates 10-30 cm (col.1, lines 20-24 and col.2, lines 61-67), and the aforementioned reads on the claimed limitation of the substrate is kept at a distance from the inductive coupling----- or at a distance of at least 8 cm from the inductive coupling.

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to employ Yin et al's teaching into Song et al's process for producing uniform plasma on the surface regions as taught by Yin et al.

Modified Song remains silent regarding the introduction of the inductively coupled coil or antenna inside the etching chamber or container.

However, Ye et al teach several advantages over conventional inductively coupled plasma etch reactors by placing the inductive coil antenna within the chamber for preventing unwanted changes in the plasma characteristics and as well as optimizing power deposition (col.6, lines 57-67, col.7, lines 34-42 and col.12, lines 60-66).

Ye et al also teach that the coil related factors such as shape. Location and orientation which can be manipulated in an effort to optimize the power deposition and etchant species diffusion patterns within the chamber (col.13, lines 16-18). So, it would have been obvious to optimize the distance between the inductive coupling and the substrate.

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to employ Ye et al's teaching into modified Song et al's process for preventing unwanted changes in the plasma characteristics and as well as optimizing power deposition as suggested by Ye et al.

As to claim 26, Yin et al teach the pressure can be varied to control the ion distribution across the wafer surface and that could be about 10 mTorr or less than 20 mTorr (col.11, lines 44-53), which reads on the claim pressure range.

As to claim 27, depositing the material all the way across to the other side of the substrate is merely one of several obvious possibilities from which a person skilled in the art would select according to the circumstances as illustrates in Song et al

As to claim 30, Song et al teach that aluminum is vapor deposited by generally known method such as PVD (col.5, lines 19-21).

As to claims 49- 50, it would have been obvious to optimize the etched depth, which is dependent on the type of device to be formed.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Collins illustrate the use of inductive coil both inside and out side of the chamber (paragraphs 0019, 0023,0087,0189).

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (571) 272-1457. The examiner can normally be reached on Tu-Fri (6:00-2:30) Every Monday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G. Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Shamim Ahmed/
Primary Examiner, Art Unit 1792

SA